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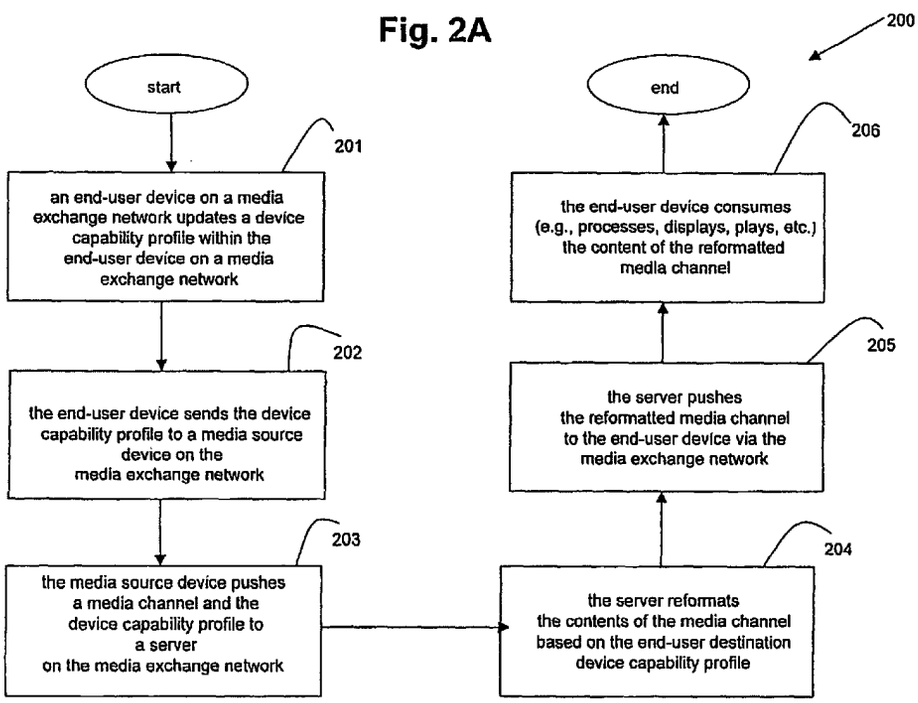
(54) Media processing system supporting different media formats via server-based transcoding

(57) Systems and methods that reformat media are described. In one embodiment, a system may include, for example, a server, a first communications device and a second communications device. The server, the first communications device and the second communications device may be operatively coupled to a network. The second communications device may receive, from the first communications device, a device profile relating to the first communications device and may send the device profile and media content to the server. The server may reformat the media content based on the device

Fig. 2A



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Description

CROSS-REFERENCE TO RELATED APPLICATIONS/ INCORPORATION BY REFERENCE

[0001] This application makes reference to, claims priority to and claims benefit from United States Patent Application Serial No. 60/470,960 (Attorney Docket No. 14972US01), entitled "Media Processing System Supporting Different Media Formats via Server-Based Transcoding" and filed on May 15, 2003; United States Patent Application Serial No. 60/443,897 (Attorney Docket No. 14276US01), entitled "Media Processing System Providing Access to Distributed Media via a Channel Guide" and filed on January 30, 2003; United States Patent Application Serial No. 60/444,099 (Attorney Docket No. 14277US01), entitled "Media Channel Setup in a Media Exchange Network" and filed on January 30, 2003; United States Patent Application Serial No. 60/443,996 (Attorney Docket No. 14281US01), entitled "Media Processing System Automatically Offering Access to Newly Available Media in a Media Exchange Network" and filed on January 30, 2003; United States Patent Application Serial No. 60/444,243 (Attorney Docket No. 14282US01), entitled "Migration of Stored Media Through a Media Exchange Network" and filed on January 30, 2003; United States Patent Application Serial No. 60/464,711 (Attorney Docket No. 14823US01), entitled "Automated Routing and Consumption of Media Through a Media Exchange Network" and filed on April 23, 2003; United States Patent Application Serial No. 60/457,179 (Attorney Docket No. 14825US01), entitled "Server Architecture Supporting a Personal Media Exchange Network" and filed on March 25, 2003; United States Patent Application Serial No. 60/467,867 (Attorney Docket No. 14967US01), entitled "Billing Support in a Media Exchange Network" and filed on May 5, 2003; United States Patent Application Serial No. 60/467,990 (Attorney Docket No. 14970US01), entitled "Media Processing System Supporting Adaptive Digital Media Parameters Based On End-User Viewing Capabilities" and filed on May 5, 2003; United States Patent Application Serial No. 60/432,472 (Attorney Docket No. 14185US01), entitled "Personal Inter-Home Media Exchange Network" and filed on December 11, 2002; and United States Patent Application Serial No. 60/443,894 (Attorney Docket No. 14274US01), entitled "Access and Control of Media Peripherals Via a Media Processing System" and filed on January 30, 2003. The complete subject matter of the above-identified applications are hereby incorporated herein by reference in their entirety.

[0002] In addition, this application makes reference to United States Patent Application Serial No. _____/_____,_____ (Attorney Docket No. 14185US02), entitled "Personal Inter-Home Media Exchange Network" and filed on September 8, 2003; and United States Patent Application Serial No. _____/_____,_____ (Attorney Docket No. 14274US02), entitled "Personal Access and Control of Media Peripherals on a Media Exchange Network" and filed on September 11, 2003. The complete subject matter of the above-identified applications are hereby incorporated herein by reference in their entirety.

FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0003] [Not Applicable]

[SEQUENCE LISTING]

[0004] [Not Applicable]

[MICROFICHE/COPYRIGHT REFERENCE]

[0005] [Not Applicable]

BACKGROUND OF THE INVENTION

[0006] Today, files having different formats for images, video, and audio may be attached to e-mail messages using a PC (personal computer) and sent to other PC's via the Internet. Also, files may be sent from one location to another over a network such as a local area network (LAN) or a wide area network (WAN) using a file transfer protocol (FTP). The files may be used in conjunction with certain media players such as PC's, DVD players, PDA's, MP3 players, etc.

[0007] The format (e.g., MPEG, JPEG, Windows Media, Quick Time, DVD sound format, AC3, CD format, etc.) of the files define their compatibility with devices. Files are often sent from a source location to a destination location without the source having any knowledge of the format capabilities of devices at the destination location.

[0008] For example, a source PC may send a JPEG image file to a destination PC without knowing what the file format capabilities are of the destination PC. The source PC may send the JPEG file to a destination PC. If the destination PC only supports TIFF format capability, then the destination PC may not be able to process and display the JPEG formatted file.

[0009] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art, through comparison of such systems with the present invention as set forth in the remainder of the present application with reference to the drawings.

BRIEF SUMMARY OF THE INVENTION

[0010] Aspects of the present invention may be found in, for example, systems and methods that reformat media content. In one embodiment, a system may include, for example, a server, a first communications device and a second communications device. The server, the first communications device and the second communications device may be operatively coupled to a network. The second communications device may receive, from the first communications device, a device profile relating

to the first communications device and may send the device profile and media content to the server. The server may reformat the media content based on the device profile.

[0011] In another embodiment, a system may include, for example, a server, a first communications device and a second communications device. The server, the first communications device and the second communications device may be operatively coupled to a network. The first communications device may send a device profile of the first communications device to the server. The second communications device may send media content to the server. The server may reformat the media content based on the device profile.

[0012] In another embodiment, a system may include, for example, a server and a communications device. The server and the communications device may be operatively coupled to a network. The communications device may receive media content of a format that is not supported by the communications device. The communications device may send a device profile of the communications device and the received media content to the server. The server may reformat the media content from the communications device into a format that is supported by the communications device based on the device profile.

[0013] In another embodiment, a system may include, for example, a communications device operatively coupled to a network. The communications device may store a revisable device profile of the communications device, send the revisable device profile to the network, and receive, from the network, media content that has been reformatted based on the device profile.

[0014] In another embodiment, a method may include, for example, one or more of the following: receiving, by a server, a device profile of a communications device and media content destined for the communications device, the server being operatively coupled to the communications device via a network; and reformatting, by the server, the media content based on the device profile.

[0015] These and other advantages, aspects and novel features of the present invention, as well as details of some illustrated embodiments thereof, will be more fully understood from the following description and drawings.

According to an aspect of the invention, a system for reformatting media content comprises: a server operatively coupled to a network; a first communications device operatively coupled to the network; and a second communications device operatively coupled to the network, the second communications device receiving, from the first communications device, a device profile relating to the first communications device and sending the device profile and media content to the server, the server reformatting the media content based on the device profile.

Advantageously, the server sends the reformatted media content to the first communications device.

Advantageously, the server transcodes the media content from a first type of format to a second type of format, wherein the second type of format is compatible with the first communications device.

Advantageously, the server comprises a dedicated format conversion server.

Advantageously, the first communications device requests the media content from the second communications device.

Advantageously, the first communications device can update the device profile.

Advantageously, the first communications device is coupled to the network via a first headend, and wherein the second communications device is coupled to the network via a second headend.

Advantageously, at least one of the first communications device, the second communications device and the server comprises a software platform that can provide at least one of a user-interface functionality, a distributed storage functionality and a networking functionality.

Advantageously, at least one of the first communications device, the second communications device and the server comprises a software platform that can provide at least one of device registration, channel setup, program setup, management and security.

Advantageously, at least one of the first communications device, the second communications device and the server is adapted to provide at least one of a distributed networking capability, an archival functionality, a temporary storage capability, a storage manager and a digital rights manager.

Advantageously, the device profile comprises information related to media capabilities of the first communications device.

Advantageously, at least one of the first communications device and the second communications device comprises a television screen that facilitates viewing and interacting with at least one of a user interface, media, data and services available on the network.

According to another aspect of the invention, a system for reformatting media content comprises: server operatively coupled to a network; a first communications device operatively coupled to the network, the first communications device sending a device profile of the first communications device to the server; and a second communications device operatively coupled to the network, the second communications device sending media content to the server, the server reformatting the media content based on the device profile.

Advantageously, the server reformats the media content to be compatible with the first communications device.

Advantageously, the server stores the device profile of the first communications device for use in reformatting other media content destined for the first communications device.

According to another aspect of the invention, a system

for reformatting media content comprises: a server operatively coupled to a network; and a communications device operatively coupled to the network, the communications device receiving media content of a format that is not supported by the communications device and sending a device profile of the communications device and the received media content to the server, the server reformatting the media content from the communications device into a format that is supported by the communications device based on the device profile.

Advantageously, the server stores the device profile of the communications device for use in reformatting other media content destined for the communications device.

According to another aspect of the invention, a system for reformatting media content comprises: a communications device operatively coupled to a network, the communications device storing a revisable device profile of the communications device, sending the revisable device profile to the network, and receiving media content, from the network, that has been reformatted based on the device profile.

Advantageously, the system comprises: a server operatively coupled to the network, wherein the server reformats the media content destined for the communications device based on the revisable device profile.

Advantageously, the server stores the revisable profile for use in reformatting other media content destined for the communications device.

According to another aspect of the invention, a method for reformatting media content comprises: receiving, by a server, a device profile of a communications device and media content destined for the communications device, the server being operatively coupled to the communications device via a network; and reformatting, by the server, the media content based on the device profile.

Advantageously, the method further comprises: sending, by a second communications device, the device profile and the media content to the server, the second communications device being operatively coupled to the server via the network.

Advantageously, the method further comprises: sending, by the communications device, the device profile of the communications device to the server, and sending, by a second communications device, the media content to the server, the second communications device being operatively coupled to the server via the network.

Advantageously, the reformatted media content is supported by the communications device.

Advantageously, the method further comprises: requesting, by the communications device, the media content from a second communications device.

Advantageously, the method further comprises: sending the reformatted media content to the communications device via the network.

Advantageously, the method further comprises: storing the device profile at the server for use in reformatting other media content destined for the communications device.

Advantageously, the method further comprises: sending, by the communications device, the device profile and the media content to the server.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Fig. 1 is a diagram illustrating an embodiment of a media exchange network comprising an architecture to support different media formats via server-based transcoding according to the present invention.

[0017] Fig. 2A is a flowchart illustrating an embodiment of a method that transcodes media content formats based on end-user media format capabilities on a media exchange network according to the present invention.

[0018] Fig. 2B is a flowchart illustrating an embodiment of a method that transcodes media content formats based on end-user media format capabilities on a media exchange network according to the present invention.

[0019] Fig. 3 is a schematic block diagram illustrating an embodiment of a media exchange network according to the present invention.

[0020] Fig. 4 is a schematic block diagram illustrating an exchange of personal media over a media exchange network according to an embodiment of the present invention.

[0021] Fig. 5 is a schematic block diagram illustrating an exchange of third-party media over a media exchange network according to an embodiment of the present invention.

[0022] Fig. 6 illustrates an embodiment of a television (TV) guide channel user interface according to the present invention.

[0023] Fig. 7 illustrates an embodiment of a TV guide channel user interface according to the present invention.

[0024] Fig. 8 illustrates an embodiment of a TV guide channel user interface showing several options of a pushed media according to the present invention.

[0025] Fig. 9A is a schematic block diagram illustrating an embodiment of a media processing system (MPS) interfacing to media capture peripherals according to the present invention.

[0026] Fig. 9B illustrates an embodiment of an MPS according to the present invention.

[0027] Fig. 10 is a schematic block diagram illustrating an embodiment of a personal computer (PC) and an MPS interfacing to a server on a media exchange network according to the present invention.

[0028] Fig. 11 is a schematic block diagram illustrating an embodiment of a PC interfacing to personal media capture devices and remote media storage on a media exchange network according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0029] Fig. 1 is a diagram illustrating an embodiment of a media exchange network 100 comprising an architecture to support different media formats via server-based transcoding according to the present invention. Some examples of video formats include the MPEG family of video formats, the Windows media formats, the Real-Player format, the Quick-Time video format, the H. 263 video format, the H 323 video format, and other new or existing video formats. Some examples of image formats include JPEG, TIFF, bit map, GIF, and PCX, and any other new or existing image formats. Some examples of audio formats include MP3, CD, AC-3, Dolby, multi-channel 51, and any other new or existing audio formats.

[0030] The media exchange network 100 may include a communication network comprising, for example, a personal computer (PC) 101, a media processing system (MPS) 102, and at least one media peripheral (MP) 103 at a 1st home 104; a PC 105, an MPS 106, and at least one MP 107 at a 2nd home 108. The MP 103 may interface to the PC 101 and/or the MPS 102 via, for example, a wireless link or a wired link (e.g., a USB connection). The PC 101 and the MPS 102 may interface to a broadband access headend 109. The broadband access headend 109 may comprise, for example, a cable headend, a satellite headend, or a DSL headend in accordance with various embodiments of the present invention. As an option, the MP 103 may interface with the broadband access headend 109. The PC 101, the MPS 102, and/or the MP 103 may include, for example, internal modems (e.g., a cable modem or a digital subscriber line (DSL) modem) or other interface devices to communicate with the broadband access headend 109. Optionally, the interface device (e.g., a modem) may be external to the PC 101, MPS 102, and MP 103.

[0031] Similarly, the MP 107 may interface to the PC 105 and/or the MPS 106 via, for example, a wireless link or a wired link (e.g., a USB connection). The PC 105 and the MPS 106 may interface to a broadband access headend 110. The broadband access headend 110 may comprise, for example, a cable headend, a satellite headend, or a DSL headend in accordance with various embodiments of the present invention. As an option, the MP 107 may interface with the broadband access headend 110. The PC 105, the MPS 106, and/or the MP 107 may include, for example, internal modems (e.g., a cable modem or a DSL modem) or other interface device to communicate with the broadband access headend 110. Optionally, the interface device (e.g., modem) may be external to the PC 105, the MPS 106, and the MP 107.

[0032] The media exchange network 100 may further comprise, for example, a broadband access headend 111 connected between a 3rd home 112 and an Internet infrastructure 115, a media exchange server 113 (e.g., as in the case of a single central server supporting the media exchange network 100) and, optionally, at least one other media exchange server 114 (e.g., as in the case of a multiple server architecture) supporting the media exchange network 100 connected to the Internet infrastructure 115. In accordance with an embodiment of the present invention, the media exchange network 100 may comprise two or more media exchange servers strategically located at various points in the media exchange network 100. Also, the media exchange network 100 may include a format conversion server 118, dedicated to converting the formats of media on the media exchange network 100 and interfacing to the Internet infrastructure 115.

[0033] The broadband access headends 109 and 110 may also interface to the Internet infrastructure 115. The broadband access headend 111 may comprise, for example, a cable headend, a satellite headend, or a DSL headend in accordance with various embodiments of the present invention. The 3rd home 112 may also include, for example, a PC, an MPS, and/or an MP as part of the media exchange network 100.

[0034] The media exchange network 100 may also comprise, for example, a media storage server 116 and a 3rd party media server 117, both interfacing to the Internet infrastructure 115. The media storage server 116 may interact with the media exchange server 113 and may provide temporary and/or archival storage for digital media on the media exchange network 100. For example, the media storage server 116 may temporarily hold media files that are addressed to certain MPS's and/or PC's on the media exchange network 100.

[0035] The 3rd party media server 117 may store, for example, movies, video, user profiles, and other digital media that may be provided to users of the media exchange network 100.

[0036] In accordance with various embodiments of the present invention, an MPS may comprise, for example, at least one of a set-top box, a PC and a TV with a media management system (MMS). An MMS is also known herein as a media exchange software (MES) platform.

[0037] In accordance with various embodiments of the present invention, an MMS may comprise a software platform operating on at least one processor to provide certain functionality including, for example, user interface functionality, distributed storage functionality and networking functionality. For example, an MMS may provide control of media peripheral devices, status monitoring of media peripheral devices and inter-home MPS routing selection in accordance with an embodiment of the present invention.

[0038] In accordance with an embodiment of the present invention, a broadband access headend may be upgraded to a media exchange headend by adding functionality to facilitate the exchange of media on the media exchange network in conjunction with the media exchange server. Such functionality may include, for example, distributed networking capability, digital media

transcoding, archival functionality (e.g., long term media storage), temporary storage (e.g., to aid in the distribution and routing of media), storage management, and digital rights management.

[0039] The media exchange network 100 may support, for example, the re-formatting (e.g., transcoding) of media content based on device capabilities of an end-user on the media exchange network 100. In accordance with an embodiment of the present invention, the media exchange servers 113 and 114 may provide at least some of the functionality on the media exchange network 100 including, for example, digital media transcoding, billing and payment, device registration, channel/program setup and management, and security. In accordance with an embodiment of the present invention, the format conversion server 118 may provide the functionality of digital media transcoding.

[0040] The various elements of the media exchange network 100 may include, for example, storage locations for digital media and data. The storage locations may comprise, for example, hard disk drives, a DVD player, a CD player, floppy disk drives, a RAM, or any combination of these. The storage locations may also include, for example, memory sticks, PCMCIA cards, compact flash cards, or any combination of these.

[0041] The PC's 101 and 105 may comprise, for example, desktop PC's, notebook PC's, PDA's, or any computing device.

[0042] In accordance with some embodiments of the present invention, the MPS's 102 and 106 may comprise enhanced set-top boxes. The MPS 102 and/or the MPS 106 may comprise, for example, a TV screen for viewing and interacting with various user interfaces, media, data, and services that are available on the media exchange network using, for example, a remote control. The PC 101 and the PC 105 may comprise, for example, a PC monitor for viewing and interacting with various user interfaces, media, data, and services that are available on the media exchange network using, for example, a keyboard and a mouse. The MPS's, the PC's, and/or the MP's may include, for example, functional software to support interaction with the various elements of the media exchange network 100 in accordance with various embodiments of the present invention.

[0043] The media peripherals 103 and 107 of the media exchange network 100 may include, for example, a digital camera, a digital camcorder, an MP3 player, a home juke-box system, a personal digital assistant (PDA), a multi-media gateway device, and various home appliances.

[0044] Other embodiments of the present invention may comprise various combinations and/or multiple instantiations of the elements of Fig. 1 according to the present invention.

[0045] End-user devices (e.g., a PDA, an MPS with a TV display, a PC with a monitor, etc.) may support different media formats such as, for example, JPEG, MPEG-II, MPEG-IV, JPEG, MP3, digital Dolby, etc. Media content transferred across a media exchange network may include, for example, images, video, and audio having different digital media formats that support different types of encoding. In a media exchange network, media content may be transferred from one user to another in a channelized manner. The media content may be incorporated into a channel format and the contents of the channel may be pushed from one user to another via the media exchange network.

[0046] In accordance with an embodiment of the present invention, a source device (e.g., a PC or an MPS) on a media exchange network may have knowledge of the device capabilities of an end-user or a destination device (e.g., a PC or an MPS) and may ensure that the format of media content sent from the source device to the end-user is consistent with the device capabilities of the end-user. For example, an MPS of a first end-user on a media exchange network may support an MPEG-II video format. An MPS of a second end-user on the media exchange network may support the Windows Media format. A PC of a third end-user on the media exchange network may only support the JPEG image format.

[0047] Fig. 2A is a flowchart illustrating an embodiment of a method 200 that transcodes media content formats based on end-user media format capabilities on the media exchange network 100 according to the present invention. In step 201, an end-user device on a media exchange network updates a device capability profile within the end-user device on a media exchange network. In step 202, the end-user device sends the device capability profile to a media source device on the media exchange network. In step 203, the media source device pushes a media channel and the device capability profile to a server on the media exchange network. In step 204, the server reformats (e.g., transcodes) the content of the media channel based on the end-user destination device capability profile. In step 205, the server pushes the reformatted media channel to the end-user device via the media exchange network. In step 206, the end-user device consumes (e.g., processes, displays, plays, etc.) the content of the reformatted media channel.

[0048] In accordance with an embodiment of the present invention, a device capability profile may include device format information corresponding to various devices of a user on the media exchange network.

[0049] As an example, referring to Fig. 1, a user at the 2nd home 108 has just upgraded the MPS 106 to handle the MPEG-IV video format. The user at the 2nd home 108 updates a device capability profile stored in the MPS 106 to indicate the new MPEG-IV capability of the MPS 106. The MPS 106 then automatically sends the updated device capability profile to the MPS 102 at the 1st home 104 over the media exchange network 100. The user of the MPS 102 at the 1st home 104 desires to send a channel including a digital video file to the user at the 2nd home 108. The MPS 102 sends the channel

of digital video, which is in a Windows Media format, to the media exchange server 113 along with the device capability profile of the MPS 106. The media exchange server re-formats (e.g., transcodes) the channel of digital video from the Windows Media format to the MPEG-IV format and pushes the transcoded channel to the MPS 106 via the media exchange network 100. The user of the MPS 106 may view the digital video in the MPEG-IV format.

[0050] In another embodiment of the present invention, the MPS 106 may send the device capability profile directly to the media exchange server 113 instead of to the individual user of the MPS 102. As a result, any user wanting to push digital video to the MPS 106 may send the digital video content to the media exchange server 113 in any format and the media exchange server 113 will know to convert the digital video content to the MPEG-IV format, for example.

[0051] Fig. 2B is a flowchart illustrating an embodiment of a method 210 that transcodes media content formats based on end-user media format capabilities on the media exchange network 100 according to the present invention. In step 211, a device on a media exchange network updates a device capability profile within the device on the media exchange network. In step 212, the device pushes a media channel and the device capability profile to a server on the media exchange network. In step 213, the server reformats the contents of the media channel based on the device capability profile. In step 214, the server pushes the reformatted media channel to the device via the media exchange network. In step 215, the device consumes (e.g., processes, displays, plays, etc.) the content of the reformatted media channel.

[0052] As an example, referring to Fig. 1, a user at the 1st home 104 has just upgraded the PC 101 to handle the AC3 audio format. The user at the 1st home 104 updates a device capability profile stored in the PC 101 to indicate the new AC3 capability of the PC 101. The PC 101 then sends the updated device capability profile and a channel of digital audio, which is in an MP3 format, to the format conversion server 118. The format conversion server 118 re-formats (e.g., transcodes) the channel of digital audio from the MP3 format to the AC3 format and pushes the transcoded channel back to the PC 101 via the media exchange network 100. The PC 101 may now play the digital video in the AC3 format.

[0053] As another example, a user at the 2nd home 108 may bring home an MP 107 (e.g., a digital camera). However, the digital camera 107 may not be directly compatible with the MPS 106 since the digital camera 107 stores images in a JPEG format and the MPS 106 only processes digital images that are in a GIF format. As a result, when JPEG images are downloaded from the digital camera 107 to the MPS 106, the MPS 106 may push the JPEG images to the format conversion server 118 on the media exchange network to have the JPEG images converted to the GIF format. The format conversion server 118, after converting the images, pushes the images in the GIF format back to the MPS 106. The MPS 106 may now process and display the images in the GIF format.

[0054] In accordance with various embodiments of the present invention, if an end-user changes a device (e.g., a PC, an MPS, an MP) on the media exchange network, then the end-user may manually update a corresponding device capability profile or the device capability profile may be automatically updated once the device is connected to the media exchange network. The updated device capability profile may then be manually or automatically sent to other users on the media exchange network such as friends and family members, for example, or to a media exchange network.

[0055] In accordance with various embodiments of the present invention, the reformatting of files of media content may be performed by an MPS or a PC on the media exchange network. If a media file is to be transferred from a source device to an end-user device, then the source device may have the capability to reformat the media file based on a device capability profile of the destination device.

[0056] Some embodiments according to the present invention may transfer and share many different types of digital media, data, and services between one device/location and another with ease while being able to index, manage, and store the digital media and data.

[0057] For example, it may be desirable to be able to distribute and to store many types of digital media in a PC and/or a television environment in a user-friendly manner without using many different types of software applications and/or unique and dedicated interfaces. Any networking issues or other technical issues may be transparent to the users. It may also be desirable to use existing hardware infrastructure, as much as possible, when providing such capability.

[0058] In an embodiment of the present invention, a media exchange network is provided that enables many types of digital media, data, and/or services to be stored, indexed, viewed, searched for, pushed from one user to another, and requested by users, via a TV channel guide look-and-feel user interface. The media exchange network also allows a user to construct personal media channels that comprise his personal digital media (e.g., captured digital pictures, digital video, digital audio, etc.), request that third-party media channels be constructed from third-party digital media, and access the media channels pushed to the user by other users on the media exchange network.

[0059] PC's may be used but are not required to interface to the media exchange network for the purpose of exchanging digital media, data, and services. Set-top-boxes or integrated MPS's may be used with the media exchange network to perform some or all of the previously described media exchange functions using, for example, a remote control with a television screen.

[0060] Set-top-boxes may be software enhanced to

create an MPS that provides full media exchange network interfacing and functionality via a TV screen with a TV guide look-and-feel. PC's may be software enhanced and may provide the same TV guide look-and-feel. Therefore, the media exchange network may support both PC's and MPS's in a similar manner. In accordance with an embodiment of the present invention, a fully integrated MPS may be designed from the ground up, having full MPS capability.

[0061] In the case of an MPS configuration, the user may use a remote control and a TV may use a keyboard and/or a mouse to access the media exchange network.

[0062] An MPS or an enhanced PC may provide, for example, a storage and distribution platform for the exchange of personal and third party digital media, data, and services as well as for bringing the conventional television channels to a user's home. An MPS and/or a PC may connect to the media exchange network via an existing communication infrastructure which may include, for example, a cable infrastructure, a DSL infrastructure, a satellite infrastructure, etc. The connection to the communication infrastructure may be hard-wired or wireless.

[0063] The media exchange network may allow users to effectively become their own broadcasters from their own homes by creating their own media channels and pushing those media channels to other authorized users on the media exchange network, such as friends and family members.

[0064] Fig. 3 illustrates a media exchange network 300 for exchanging and sharing digital media, data, and services in accordance with an embodiment of the present invention. The media exchange network 300 may comprise, for example, a secure, closed network environment that is only accessible to pre-defined users and service providers. The media exchange network of Fig. 3 comprises a first PC 301 and a first MPS 302 at a user's home 303, a communication infrastructure 304, an external processing hardware support 305, a remote media storage 306, a second PC 307 at a remote location 308 such as an office, and a second MPS 309 at a parent's home 310.

[0065] The PC's 301 and 307 and the MPS's 302 and 309 may each include a media exchange software (MES) platform 311 and a networking component 312 for connectivity. The MES platform 311 provides multiple capabilities including, for example, media "push" capability, media "access" capability, media channel construction/selection, image sequence selection, text and voice overlay, channel and program naming, inter-home routing selection, authorship and media rights management, shared inter-home media experience, billing service, and an integrated TV channel guide look-and-feel.

[0066] The external processing hardware support 305 may comprise, for example, at least one server such as a centralized Internet server, a peer-to-peer server, or a cable headend. The server may alternatively be distributed over various hosts or remote PC's. The MES platform 311 may reside on the external processing hardware support server 305. The remote media storage 306 may comprise, for example, user media storage and distribution systems 313 and/or third party media storage and distribution systems 314.

[0067] The communication infrastructure 304 may comprise, for example, at least one of an Internet infrastructure, a satellite infrastructure, a cable infrastructure, a dial-up infrastructure, a cellular infrastructure, an xDSL infrastructure, an optical infrastructure, or some other infrastructure. The communication infrastructure 304 may link the user's home 303, the parent's home 310, the remote media storage 306, and the remote location office 308 to each other (e.g., the communication infrastructure 304 may link all users and service providers of the media exchange network 300).

[0068] The various functions 315 of the media exchange network 300 may comprise, for example, generating personal network associations, personal storage management, media capture device support, security/authentication/authorization support, authorship tracking and billing and address registration and maintenance. These media exchange management functions 315 may be distributed over various parts of the media exchange network 300. For example, the personal network associations and personal storage management functions may be integrated into the PC 301 at the user's home 303.

[0069] Fig. 4 illustrates an example of a personal media exchange over a media exchange network 400 in accordance with an embodiment of the present invention. In step 1, the media exchange software (MES) platform 401 is used to construct personal media channels on a PC 402 by a user at "my house" 403. For example, with various media stored on the PC 402 such as digital pictures 404, videos 405, and music 406, the MES platform 401 allows the digital media to be organized by a user into several channels having a TV channel guide look-and-feel user interface 407 on the PC 402.

[0070] In step 2, the user at "my house" 403 pushes a media channel 408 (e.g., "Joe's Music") to "brother's house" 409 and pushes two media channels 410 and 411 (e.g., "Vacation Video" and "Kid's Pictures") to "Mom's house" 412 via a peer-to-peer server 413 over the Intemet-based media exchange network 400. "Brother's house" 409 includes a first MPS 414 connected to the media exchange network 400. "Mom's house" 412 includes a second MPS 415 connected to the media exchange network 400. The MPS's 414 and 415 also provide a TV channel guide look-and-feel user interface 407.

[0071] In step 3, brother and/or Mom access the pushed media channels via their respective media processing systems (MPS's) 414 and 415 using their respective MPS TV screens and remote controls.

[0072] Fig. 5 illustrates an example of a third-party media exchange over a media exchange network 500 in accordance with an embodiment of the present inven-

tion. In step 1, a PC-initiated third-party request is made by a first party 501 via an Internet-based media exchange network 500 using a TV channel guide look-and-feel user interface 502 on a PC 503. In step 2, an anonymous delivery of the requested third-party channel 504 is made to a second party 505 via the Internet-based media exchange network 500. In step 3, the second party 505 accesses the third-party channel 504 using a TV channel guide look-and-feel user interface 506 on a TV screen 507 that is integrated into an MPS 508.

[0073] Similarly, in step A, an MPS-initiated third-party request is made by a second party 505 via an Internet-based media exchange network 500 using a TV channel guide look-and-feel user interface 506 on a TV screen 507 using a remote control 509. The second party 505 may key in a code, using the remote control 509, that is correlated to a commercial or some other third party broadcast media. In step B, an anonymous delivery of the requested third-party channel 504 is made to a first party 501 via the Internet-based media exchange network 500. In step C, the first party 501 accesses the third-party channel 504 using a TV channel guide look-and-feel user interface 502 on a PC 503.

[0074] Fig. 6 illustrates a TV channel guide user interface 600 in accordance with an embodiment of the present invention. The TV channel guide user interface 600 may be displayed on a TV screen 608 and controlled by a remote control device 609. Also, the TV channel guide user interface 600 may be displayed on a PC monitor and controlled by a keyboard or a mouse.

[0075] The TV channel guide user interface 600 may be configured not only for conventional TV channels, but also for personal media channels 601 that are constructed by a user of a media exchange network, friend's and family's media channels 602 constructed by friends and family, and third party channels 603 that are constructed by third parties either upon request by a user of a media exchange network or based on a profile of a user.

[0076] The personal media channels 601 may include, for example, a "family vacations channel", a "kid's sports channel", a "my life channel", a "son's life channel", a "my music channel", and a "kid's music channel". The friends and family media channels 602 may include, for example, a "brother's channel", a "Mom's channel", and a "friend's channel". The third party media channels 603 may include, for example, a "Sears Fall sale channel" and a "car commercials channel".

[0077] Each media channel may correspond to a schedule 604 showing, for example, a week 605 and a year 606. For example, under the "kid's sports channel", Ty's soccer game could be scheduled to be viewed on Tuesday of the current week 605 and current year 606. For each media channel, a sub-menu 607 allows for selection of certain control and access functions such as, for example, "play", "send to list", "send to archive", "confirm receipt", "view", "purchase", and "profile".

[0078] Fig. 7 illustrates possible multiple instantiations of a TV channel guide user interface 700 in accordance with an embodiment of the present invention. The TV channel guide user interface 700 may be viewed with a schedule having formats of, for example, "month, year", "week#, year", "day, week#", or "hour, day".

[0079] Referring to Fig. 8, a user of a media exchange network may push a media channel (e.g., "Vacation in Alaska Video") to a friend who is on the same media exchange network. The TV channel guide user interface 800 may give the friend several options 801 for accepting and downloading the pushed media in accordance with an embodiment of the present invention.

[0080] For example, a first, most expensive option 803 may be "Express Delivery" which would deliver the pushed media to the friend in 18 minutes using queuing and cost $1.20, for example. The pushed media may be stored in a file in an MPEG 2 format that was recorded at a rate of 4 Mbps, for example. Queuing may comprise, for example, buffering and delivering a previous part of the media and then buffering and delivering a next part of the media. For example, a first six minutes of the "Vacation in Alaska Video" may be buffered and delivered first, then a second six minutes may be buffered and delivered next, and so on until the entire media is delivered.

[0081] A second, less expensive option 802 may be "Normal Delivery" which would deliver the pushed media in 2 hours and 13 minutes without queuing and cost $0.59, for example. The pushed media may be stored in a file in an MPEG 2 format that was recorded at a rate of 1.5 Mbps, for example.

[0082] A third, least expensive option 804 may be "Overnight Delivery" which would deliver the pushed media by the next morning and cost only $0.05, for example. The pushed media may be stored in a file in an MPEG 2 format that was recorded at a rate of 19 Mbps and stored on a server, for example.

[0083] Fig. 9A illustrates some elements of a media processing system (MPS) 900 and media capture devices 901 in accordance with an embodiment of the present invention. The media capture devices 901 may comprise, for example, audio, video, and image players, such as digital cameras, digital camcorders, and MP3 players, that each may include, for example, a temporary storage area 902 and a communication interface 903 such as, for example, a wired interface (e.g., a USB interface) or a wireless interface. The media capture devices 901 may interface to an MPS and a PC.

[0084] The MPS 900 may comprise, for example, a media processing unit (MPU) 904, remote user interface(s) 905, and a TV screen 918 to provide integrated media processing capability and indirect user interface capability. The remote user interfaces 905 may comprise, for example, a voice or keyed remote control 906, keyboards and pads 907, a remote PC access interface 908, and a remote media system access interface 909 (e.g., providing access from another MPS).

[0085] The media processing unit (MPU) 904 may comprise, for example, TV and radio tuners 910 for im-

age and audio consumption, communications interfaces 911, channel processing 912 (e.g., creating, storing, indexing, and viewing), storage 913, media players 914 (e.g., CD players, DVD players, tape players, PVRs, and MP3 players), an integrated user interface 915 (e.g., to provide a TV channel guide look-and-feel), networking components 916 to provide client functions such as, for example, consumption (e.g., billing), authorization (e.g., using digital certificates and digital ID's), registration, security, and connectivity. In accordance with an embodiment of the present invention, the networking components 916 may include a distributed server element 917 that is part of a distributed server.

[0086] Fig. 9B illustrates an embodiment of a media processing system (MPS) 920 in accordance with various aspects of the present invention. The MPS 920 may comprise, for example, an enhanced set-top box for viewing and interacting with various user interfaces, media, data and services that are available on the media exchange network using, for example, a remote control. The MPS 920 may comprise, for example, a media peripheral 921, a media management system (MMS) 922 and a broadband communication interface 923.

[0087] The media peripheral 921 may include, for example, a TV, a PC and media players (e.g., a CD player, a DVD player, a tape player and an MP3 player) for video, image and audio consumption of broadcast channels and/or personal channels. The broadband communication interface 923 may include, for example, internal modems (e.g., a cable modem or a DSL modem) or other interface devices to communicate with, for example, a cable or satellite headend.

[0088] The MMS 922 may include a software platform to provide functionality including, for example, media "push" capability, media "access" capability, media channel construction/selection, image sequence selection, text and voice overlay, channel and program naming, inter-home routing selection, authorship and media rights management, shared inter-home media experience, billing service and a media guide user interface providing an integrated TV channel guide look-and-feel.

[0089] Fig. 10 illustrates connectivity between a PC 1000, an MPS 1001, and an external processing hardware 1002 (e.g., a server) in accordance with an embodiment of the present invention. The PC 1000 and the MPS 1001 may include networking components 1003 to provide client functions such as, for example, consumption (e.g., billing), authorization, registration, security, and connectivity. In accordance with various embodiments of the present invention, the PC 1000 and the MPS 1001 may include a distributed server element 1004 that is part of a distributed server.

[0090] The PC 1000 and the MPS 1001 may connect to the external processing hardware 1002 via wired connections or wireless connections in accordance with various embodiments of the present invention. The external processing hardware 1002 may comprise, for example, a distributed server or a peer-to-peer server. The external processing hardware 1002 also may comprise communication interfaces 1005 (e.g., cable interfaces, optical interfaces, etc.) and a media exchange software (MES) platform 1006. The MES platform 1006 in the external processing hardware 1002 may allow for communication with the PC 1000 and the MPS 1001 which may also use the same MES platform 1006. The external processing hardware 1002 may also include networking server components 1007 to provide the similar client functions such as, for example, consumption (e.g., billing), authorization, registration, security, and connectivity at the server side.

[0091] Fig. 11 illustrates connectivity between a PC 1100, a remote media storage 1101, and personal media capture devices 1102 when the PC 1100 is used as the primary distributor of digital media such as in the case of a PC-to-PC operation, in accordance with an embodiment of the present invention. The personal media capture devices 1102 and the remote media storage 1101 may connect to the PC 1100 via a wireless connection or a wired connection. The remote media storage 1101 may provide user media storage and distribution 1103 as well as third party media storage and distribution 1104. The personal media capture devices 1102 may provide temporary storage 1114 and communication interfaces 1115.

[0092] Viewing may be done using a PC monitor 1105 instead of a television screen in accordance with various embodiments of the present invention. The PC 1100 may include, for example, storage 1106, TV/radio tuners 1107 for media consumption, media players 1108, and communication interfaces 1109 and user interfaces 1110 similar to those for the MPS of Fig. 9. The PC 1100 may include a media exchange software (MES) platform 1111 that provides channel construction capability 1112 and networking capability 1113. The channel construction capability 1112 may provide, for example, third party and personal media access, sequencing, editing, media overlays and inserts, billing, scheduling, and addressing.

[0093] In summary, some embodiments of the present invention may relate to systems and methods that support adaptive media parameters on a media exchange network. Media parameters such as resolution, image size, audio quality, etc. may be adapted for certain media content to make the media content more compatible with end-user device capabilities.

[0094] While the present invention has been described with reference to certain embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted without departing from the scope of the present invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the present invention without departing from its scope. Therefore, it is intended that the present invention not be limited to the particular embodiments disclosed, but that the present invention will include all em-

bodiments falling within the scope of the appended claims.

Claims

1. A system for reformatting media content, comprising: a server operatively coupled to a network; a first communications device operatively coupled to the network; and a second communications device operatively coupled to the network, the second communications device receiving, from the first communications device, a device profile relating to the first communications device and sending the device profile and media content to the server.

2. The system of claim 1, wherein the server is adapted for reformatting the media content based on the device profile.

3. The system of claim 2, wherein the server sends the reformatted media content to the first communications device.

4. The system of any of the preceding claims, wherein the server transcodes the media content from a first type of format to a second type of format, wherein the second type of format is compatible with the first communications device.

5. A system for reformatting media content, comprising: a server operatively coupled to a network; a first communications device operatively coupled to the network, the first communications device sending a device profile of the first communications device to the server; and a second communications device operatively coupled to the network, the second communications device sending media content to the server, the server reformatting the media content based on the device profile.

6. The system of claim 5, wherein the server reformats the media content to be compatible with the first communications device.

7. A system for reformatting media content, comprising: a server operatively coupled to a network; and a communications device operatively coupled to the network, the communications device receiving media content of a format that is not supported by the communications device and sending a device profile of the communications device and the received media content to the server, the server reformatting the media content from the communications device into a format that is supported by the communications device based on the device profile.

8. The system of claim 7, wherein the server stores the device profile of the communications device for use in reformatting other media content destined for the communications device.

9. A system for reformatting media content, comprising: a communications device operatively coupled to a network, the communications device storing a revisable device profile of the communications device, sending the revisable device profile to the network, and receiving media content, from the network, that has been reformatted based on the device profile.

10. A method for reformatting media content, comprising: receiving, by a server, a device profile of a communications device and media content destined for the communications device, the server being operatively coupled to the communications device via a network; and reformatting, by the server, the media content based on the device profile.

Fig. 1

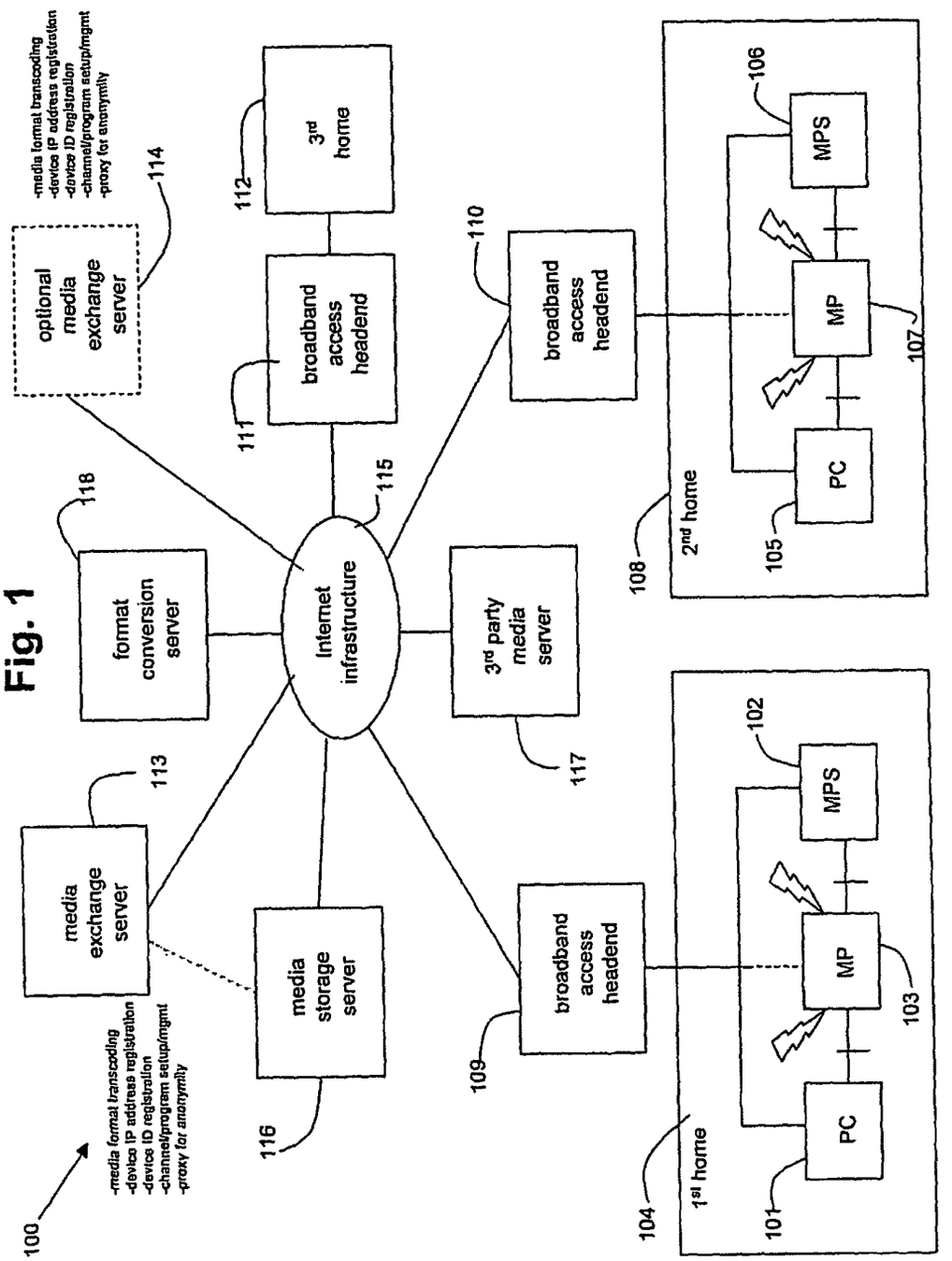
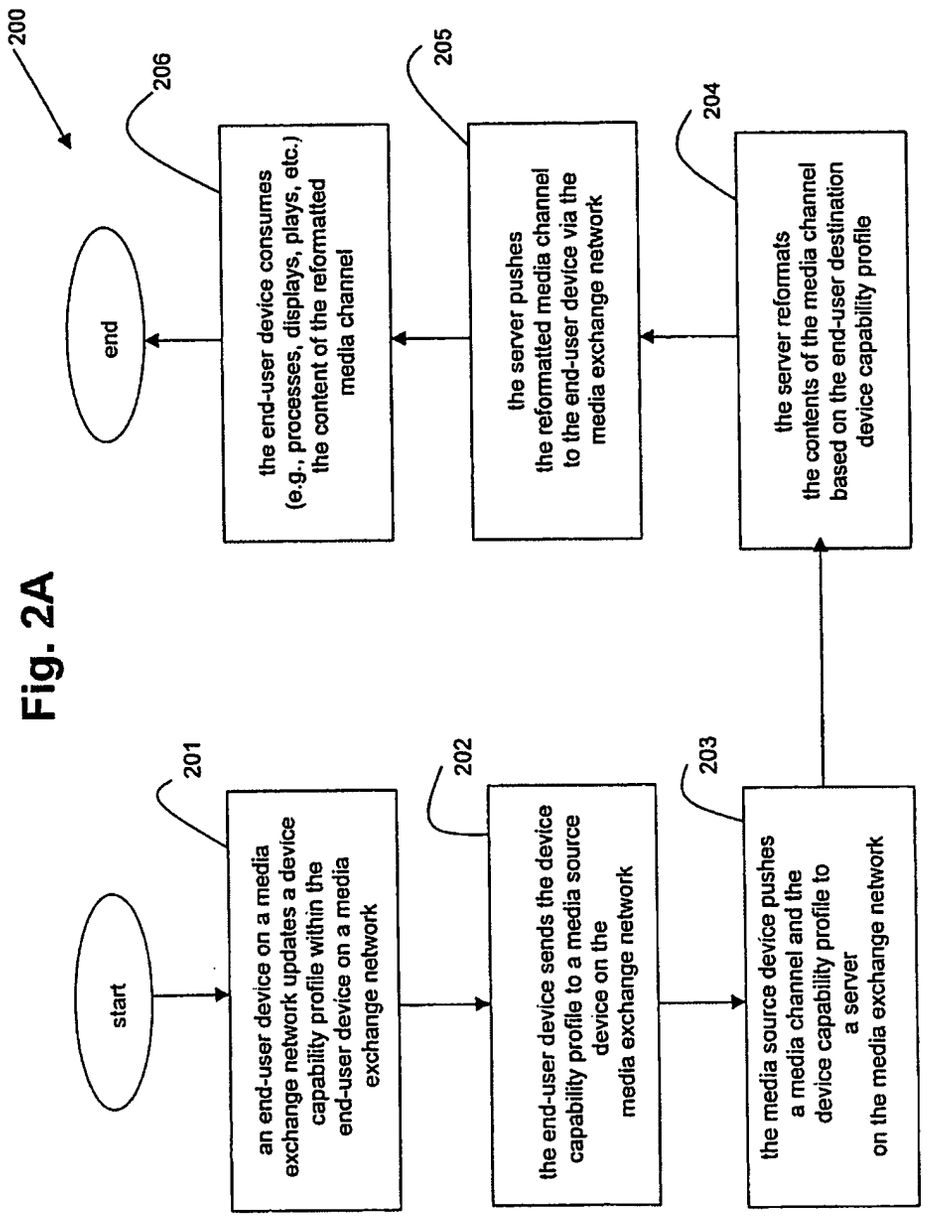

optional media exchange server
-media format transcoding
-device IP address registration
-device ID registration
-channel/program setup/mgmt
-proxy for anonymity
114
3rd home
112
broadband access headend
111
broadband access headend
110
broadband access headend
109
format conversion server
118
Internet infrastructure
115
3rd party media server
117
media exchange server
113
media storage server
116
-media format transcoding
-device IP address registration
-device ID registration
-channel/program setup/mgmt
-proxy for anonymity
100
2nd home
108
MPS
106
MP
107
PC
105
1st home
104
MPS
102
MP
103
PC
101

Fig. 2A


200
start
201
an end-user device on a media exchange network updates a device capability profile within the end-user device on a media exchange network
202
the end-user device sends the device capability profile to a media source device on the media exchange network
203
the media source device pushes a media channel and the device capability profile to a server on the media exchange network
204
the server reformats the contents of the media channel based on the end-user destination device capability profile
205
the server pushes the reformatted media channel to the end-user device via the media exchange network
206
the end-user device consumes (e.g., processes, displays, plays, etc.) the content of the reformatted media channel
end

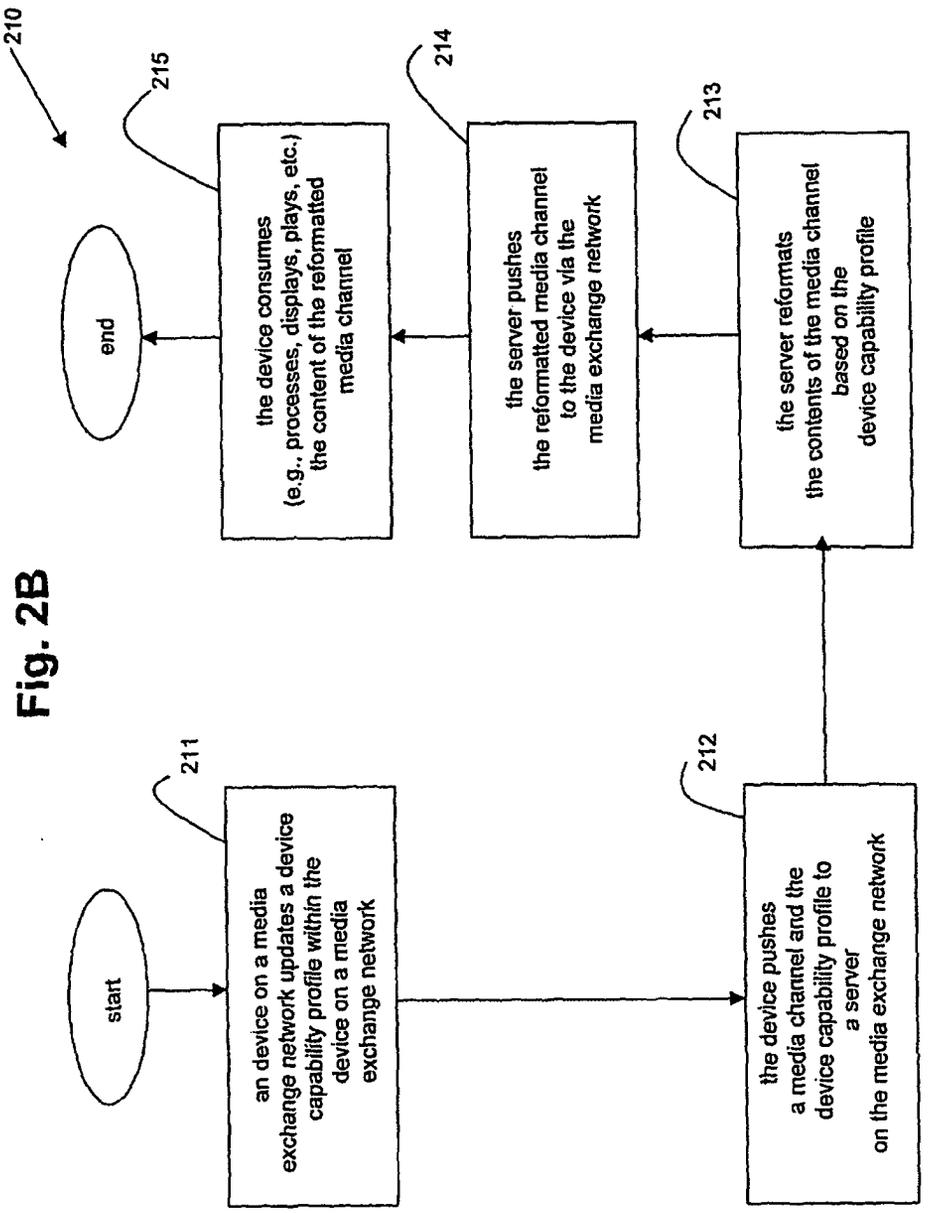

210
start
211
an device on a media exchange network updates a device capability profile within the device on a media exchange network
212
the device pushes a media channel and the device capability profile to a server on the media exchange network
213
the server reformats the contents of the media channel based on the device capability profile
214
the server pushes the reformatted media channel to the device via the media exchange network
215
the device consumes (e.g., processes, displays, plays, etc.) the content of the reformatted media channel
end

Fig. 2B

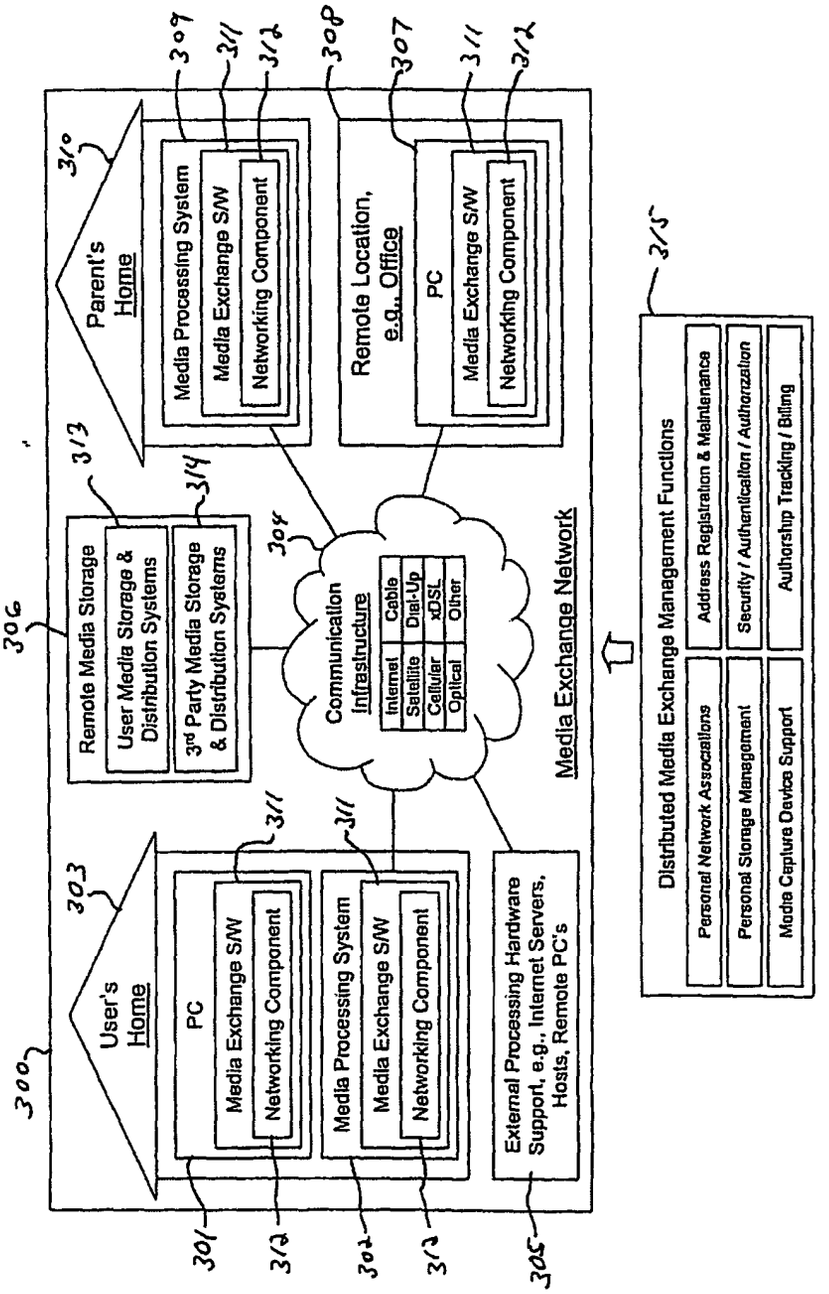

300
User's Home
303
PC
Media Exchange S/W
Networking Component
311
Media Processing System
Media Exchange S/W
Networking Component
311
External Processing Hardware Support, e.g., Internet Servers, Hosts, Remote PC's
Media Exchange Network
Remote Media Storage
User Media Storage & Distribution Systems
313
3rd Party Media Storage & Distribution Systems
314
306
Communication Infrastructure
Internet
Satellite
Cellular
Optical
Cable
Dial-Up
xDSL
Other
309
Parent's Home
310
Media Processing System
Media Exchange S/W
Networking Component
311
312
308
Remote Location, e.g., Office
307
PC
Media Exchange S/W
Networking Component
311
312
315
Distributed Media Exchange Management Functions
Personal Network Associations
Address Registration & Maintenance
Personal Storage Management
Security / Authentication / Authorization
Media Capture Device Support
Authorship Tracking / Billing
301
312
302
312
305

Fig. 3

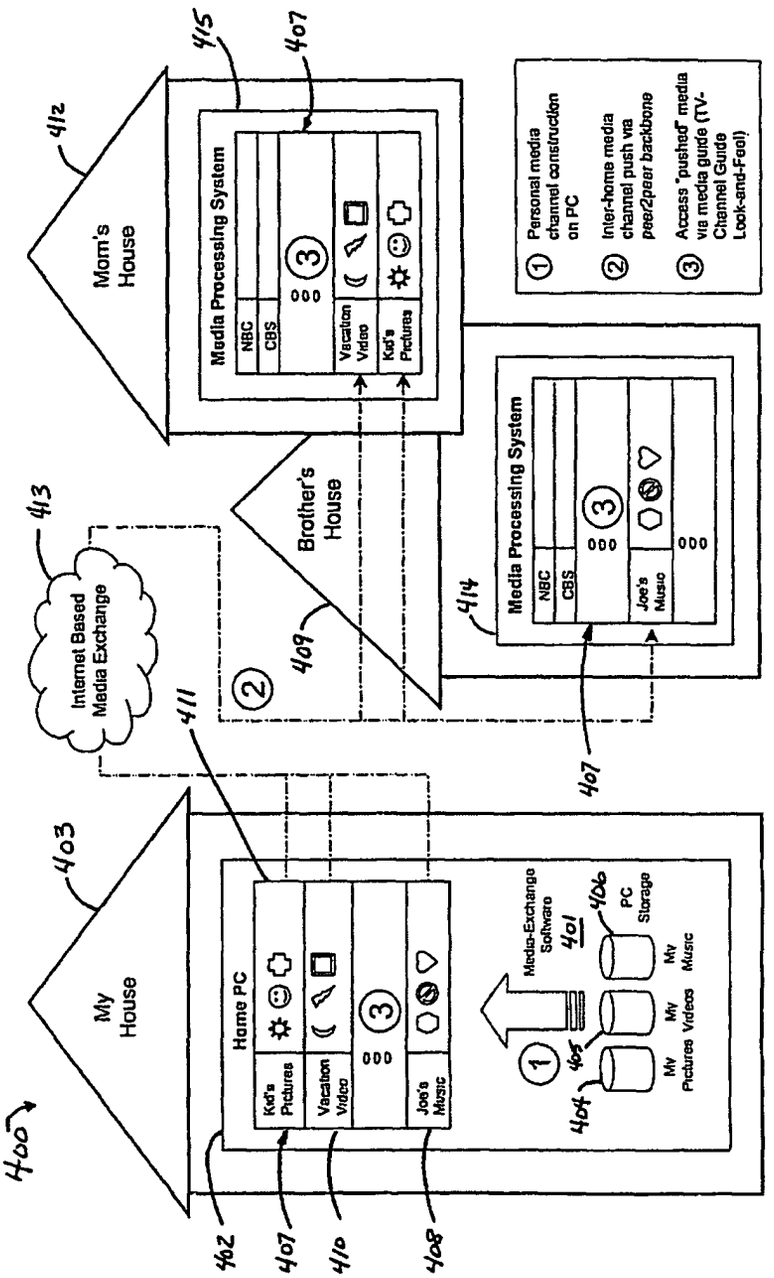

400
My House
403
Home PC
Kid's Pictures
Vacation Video
Joe's Music
Media-Exchange Software
401
PC Storage
406
My Pictures
My Videos
My Music
404
405
1
2
3
Internet Based Media Exchange
413
411
Brother's House
409
Media Processing System
NBC
CBS
Joe's Music
414
407
Mom's House
412
Media Processing System
NBC
CBS
Vacation Video
Kid's Pictures
415
407
1 Personal media channel construction on PC
2 Inter-home media channel push via peer2peer backbone
3 Access "pushed" media via media guide (TV-Channel Guide Look-and-Feel)
402
407
410
408

Fig. 4

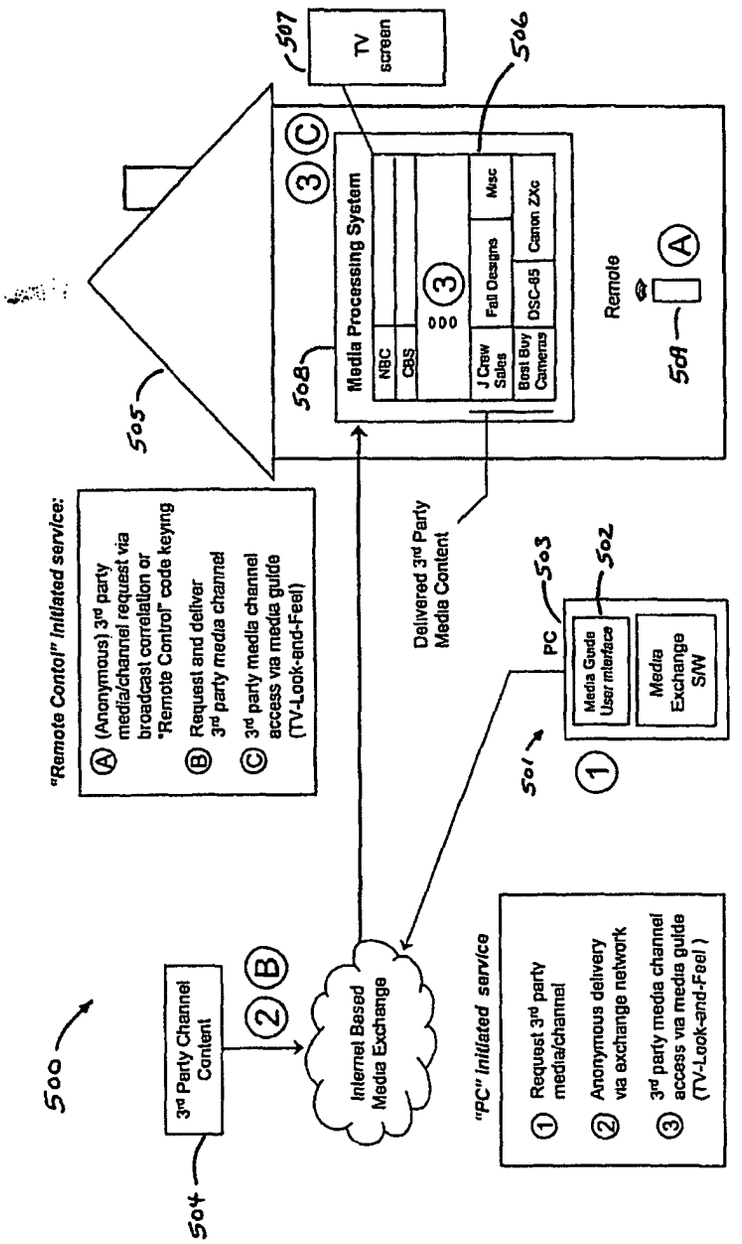

500
3rd Party Channel Content
504
Internet Based Media Exchange
"Remote Contol" initiated service:
(A) (Anonymous) 3rd party media/channel request via broadcast correlation or "Remote Control" code keying
(B) Request and deliver 3rd party media channel
(C) 3rd party media channel access via media guide (TV-Look-and-Feel)
505
507
TV screen
506
Media Processing System
NBC
CBS
J Crew Sales
Brad Buy Cameras
Fall Designs
DSC-85
Canon ZXc
Misc
508
Remote
509
Delivered 3rd Party Media Content
PC
503
502
Media Guide User interface
Media Exchange S/W
501
"PC" initiated service
1 Request 3rd party media/channel
2 Anonymous delivery via exchange network
3 3rd party media channel access via media guide (TV-Look-and-Feel)

Fig. 5

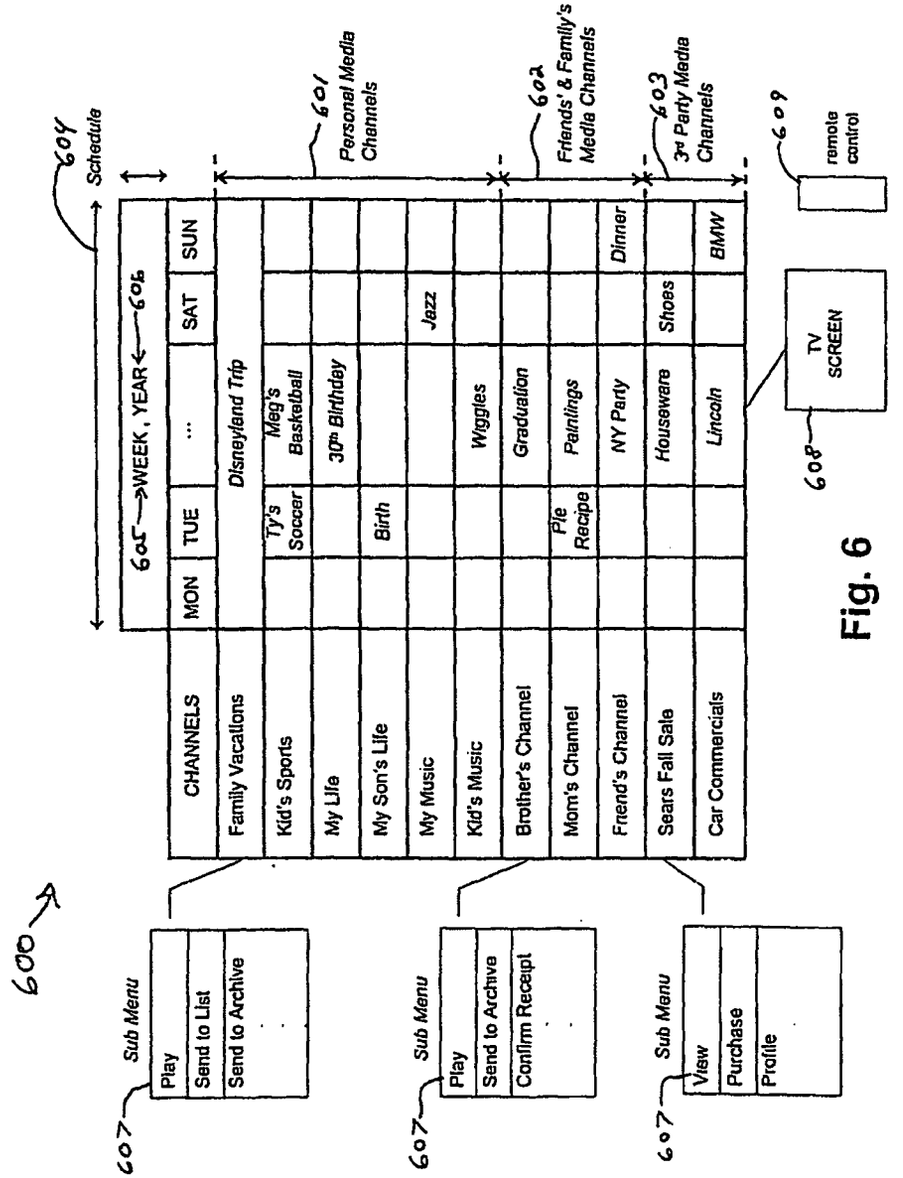

600
604
Schedule
605 → WEEK, YEAR ← 606
CHANNELS
MON
TUE
...
SAT
SUN
Family Vacations
Disneyland Trip
Kid's Sports
Ty's Soccer
Meg's Basketball
My Life
30th Birthday
My Son's Life
Birth
My Music
Jazz
Kid's Music
Wiggles
Brother's Channel
Graduation
Mom's Channel
Pie Recipe
Paintings
Friend's Channel
NY Party
Dinner
Sears Fall Sale
Housewares
Shoes
Car Commercials
Lincoln
BMW
601
Personal Media Channels
602
Friends' & Family's Media Channels
603
3rd Party Media Channels
609
remote control
608
TV SCREEN
607
Sub Menu
Play
Send to List
Send to Archive
Send to Archive
Confirm Receipt
View
Purchase
Profile

Fig. 6

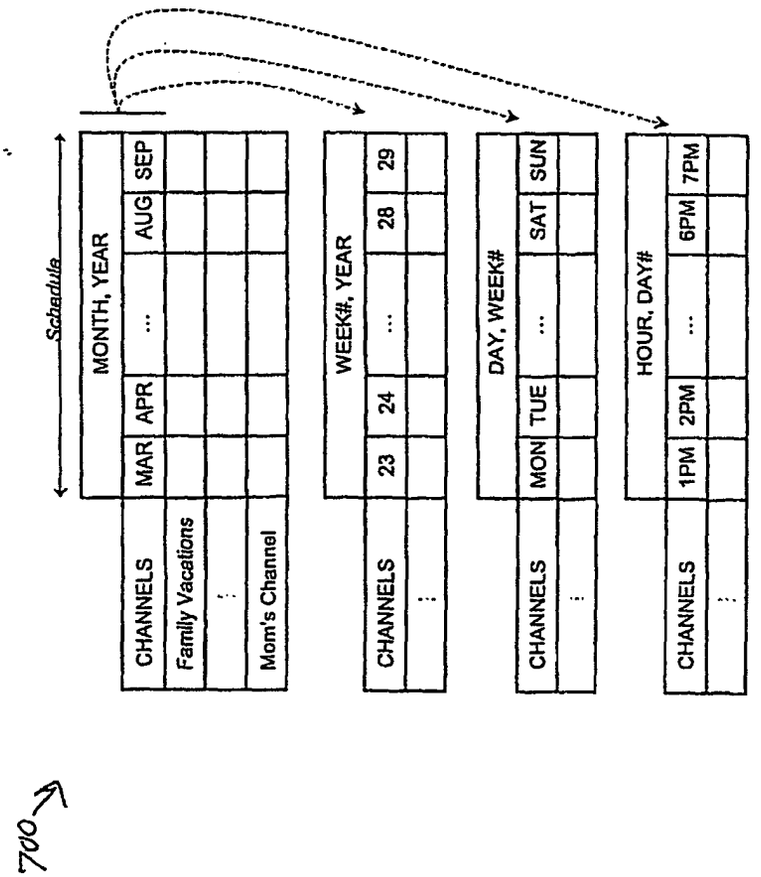

Schedule
MONTH, YEAR
CHANNELS
MAR
APR
...
AUG
SEP
Family Vacations
Mom's Channel
WEEK#, YEAR
23
24
28
29
DAY, WEEK#
MON
TUE
SAT
SUN
HOUR, DAY#
1PM
2PM
6PM
7PM
700

Fig. 7

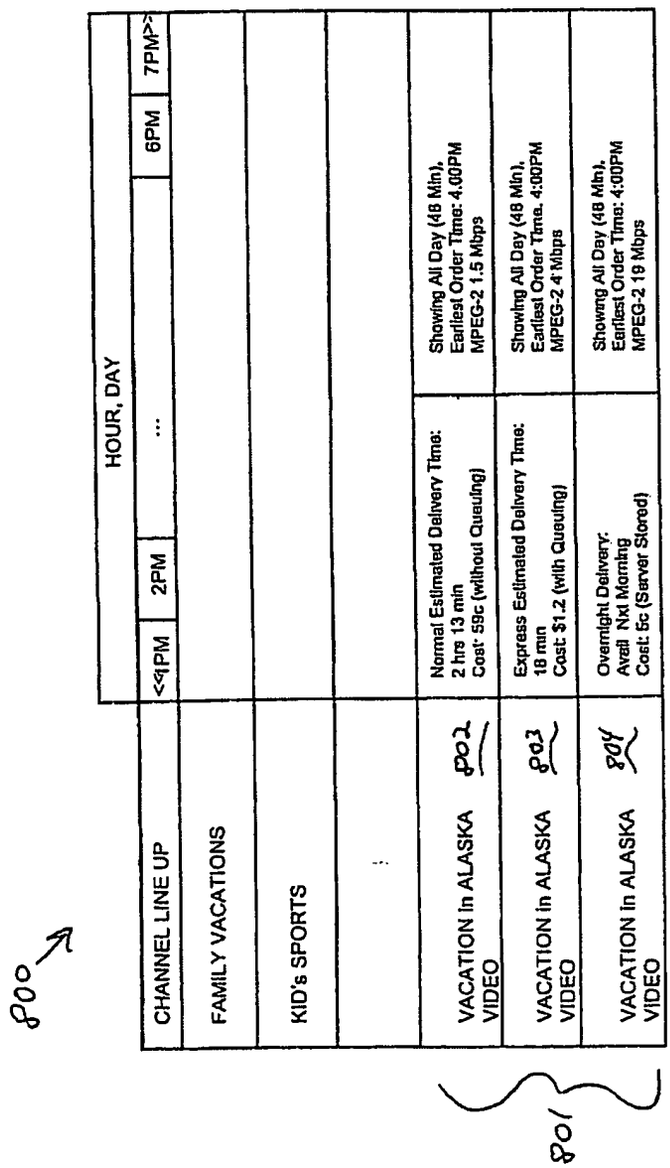

800
HOUR, DAY
CHANNEL LINE UP
<<1PM
2PM
...
6PM
7PM>>
FAMILY VACATIONS
KID's SPORTS
VACATION in ALASKA VIDEO
802
Normal Estimated Delivery Time: 2 hrs 13 min Cost: 59c (without Queuing)
Showing All Day (48 Min), Earliest Order Time: 4:00PM MPEG-2 1.5 Mbps
VACATION in ALASKA VIDEO
803
Express Estimated Delivery Time: 18 min Cost: $1.2 (with Queuing)
Showing All Day (48 Min), Earliest Order Time: 4:00PM MPEG-2 4 Mbps
VACATION in ALASKA VIDEO
804
Overnight Delivery: Avail Nxt Morning Cost: 5c (Server Stored)
Showing All Day (48 Min), Earliest Order Time: 4:00PM MPEG-2 19 Mbps
801

Fig. 8

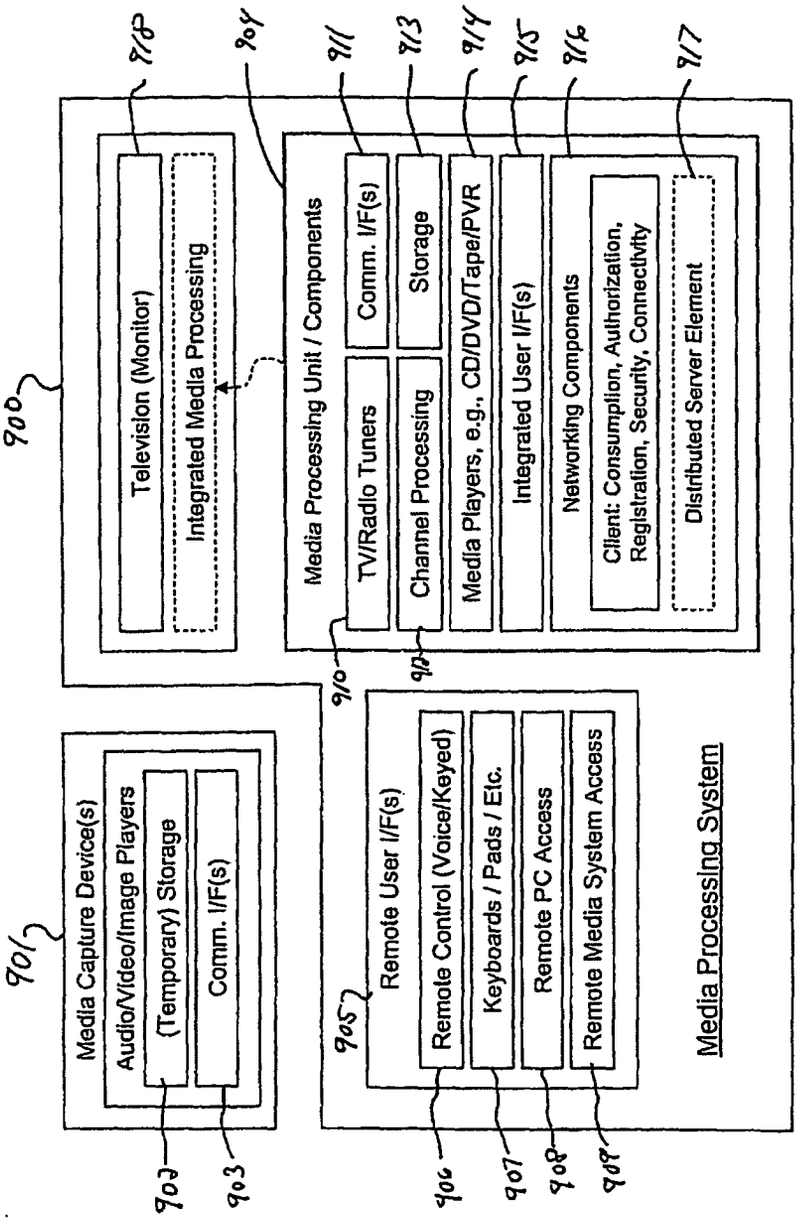
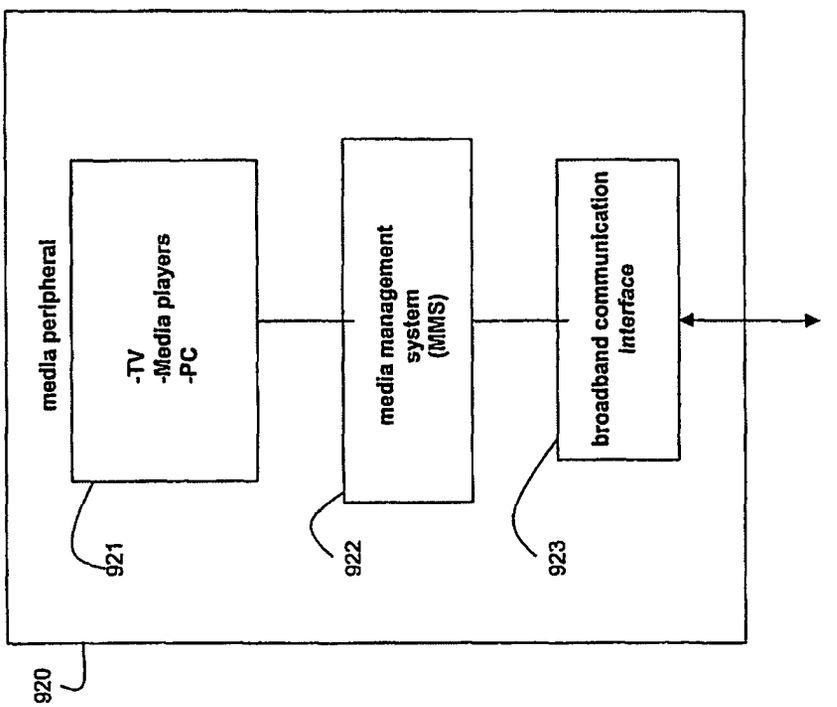
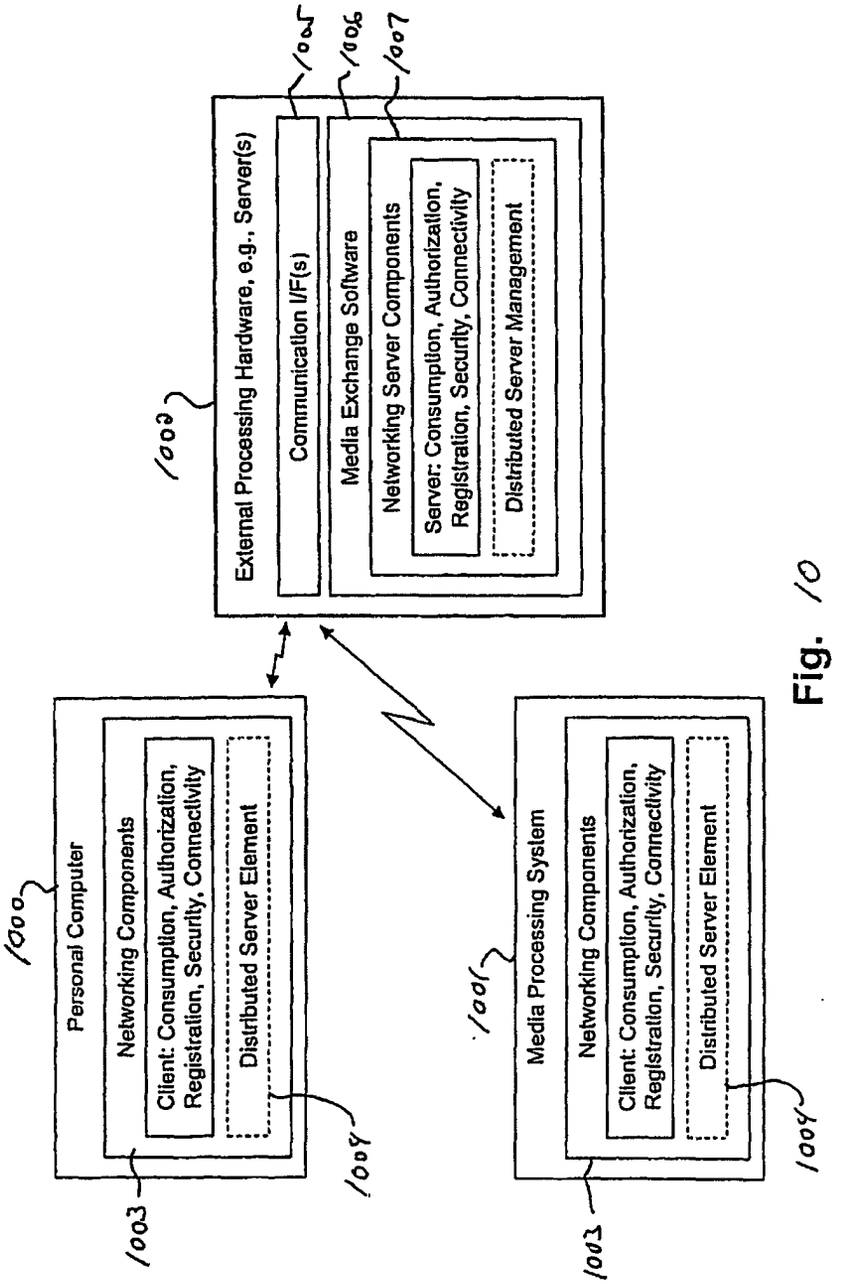

900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
Media Capture Device(s)
Audio/Video/Image Players
(Temporary) Storage
Comm. I/F(s)
Remote User I/F(s)
Remote Control (Voice/Keyed)
Keyboards / Pads / Etc.
Remote PC Access
Remote Media System Access
Media Processing System
Television (Monitor)
Integrated Media Processing
Media Processing Unit / Components
TV/Radio Tuners
Channel Processing
Comm. I/F(s)
Storage
Media Players, e.g., CD/DVD/Tape/PVR
Integrated User I/F(s)
Networking Components
Client: Consumption, Authorization, Registration, Security, Connectivity
Distributed Server Element

Fig. 9A

Fig. 9B


media peripheral
-TV
-Media players
-PC
media management system (MMS)
broadband communication interface
920
921
922
923


External Processing Hardware, e.g., Server(s)
Communication I/F(s)
Media Exchange Software
Networking Server Components
Server: Consumption, Authorization, Registration, Security, Connectivity
Distributed Server Management
Personal Computer
Networking Components
Client: Consumption, Authorization, Registration, Security, Connectivity
Distributed Server Element
Media Processing System
Networking Components
Client: Consumption, Authorization, Registration, Security, Connectivity
Distributed Server Element
1000
1001
1002
1003
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1005
1006
1007
1008
1009

Fig. 10

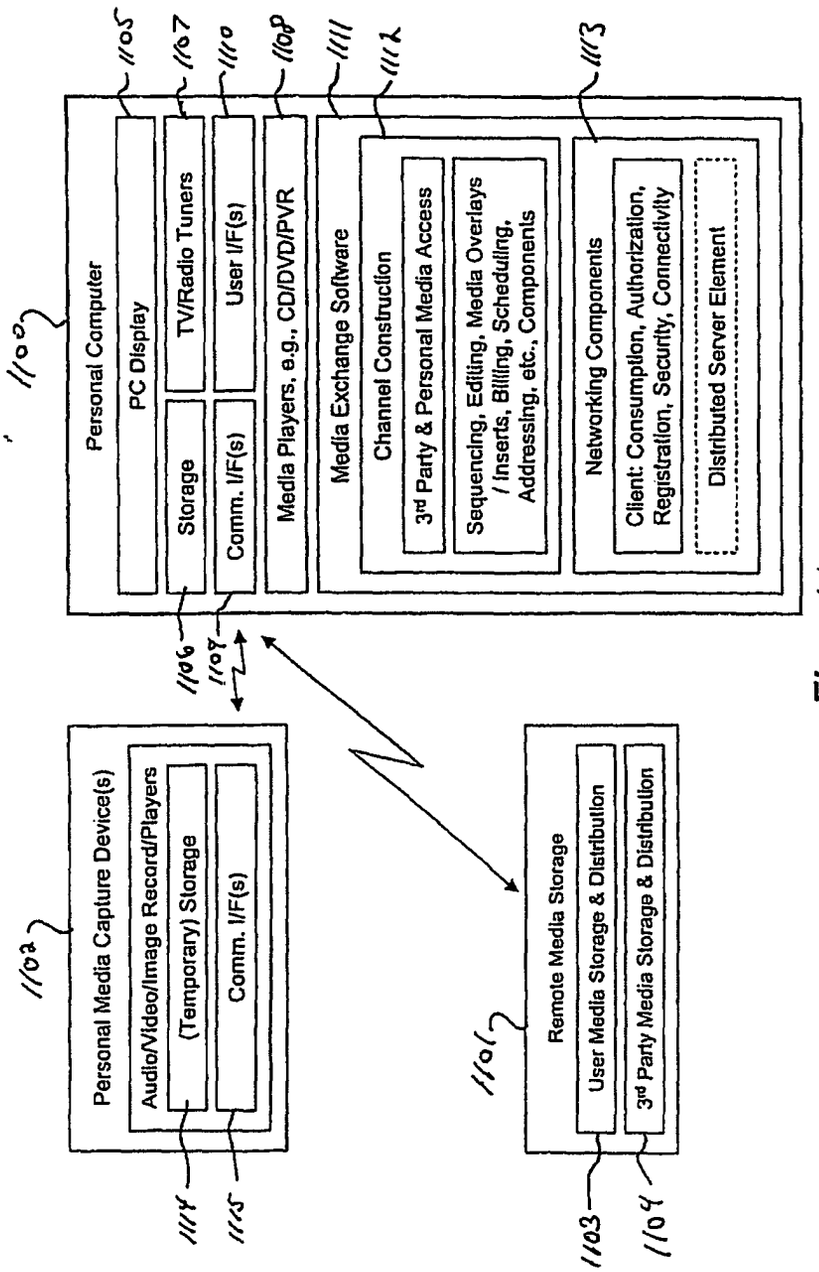
Personal Computer
PC Display
Storage
Comm. I/F(s)
TV/Radio Tuners
User I/F(s)
Media Players, e.g., CD/DVD/PVR
Media Exchange Software
Channel Construction
3rd Party & Personal Media Access
Sequencing, Editing, Media Overlays / Inserts, Billing, Scheduling, Addressing, etc., Components
Networking Components
Client: Consumption, Authorization, Registration, Security, Connectivity
Distributed Server Element
Personal Media Capture Device(s)
Audio/Video/Image Record/Players
(Temporary) Storage
Comm. I/F(s)
Remote Media Storage
User Media Storage & Distribution
3rd Party Media Storage & Distribution

Fig. 1

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 00 6742

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	30 June 2004	Bertrand, F

CATEGORY OF CITED DOCUMENTS

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Application Number
EP 04 00 6742

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Place of search	Date of completion of the search	Examiner
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